Ontario

Ontario Ministry of Agriculture and Food

2004 SUPPLEMENT

Flue-Cured Tobacco Production Recommendations

Publication 298S

This supplement contains changes/additions/deletions to Publication 298. For complete recommendations, refer to the original publication and include these changes.

CHAPTER 1. PRECAUTIONS WITH PESTICIDES

Page 2. General Precautions

Remove Existing caution box.

Replace with Learn about the proper storage requirements and shelf-life of the pesticide you are using. Consult the product label, Material Safety Data Sheets (MSDS), manufacturer or agricultural chemical dealer for this information. Check the company web sites for MSDS information.

CHAPTER 2. SOIL MANAGEMENT AND FERTILIZER USE

Page 19. Soil testing — third paragraph

Remove Be sure that any testing service you use is accredited.

Replace with Be sure to ask for OMAF fertilizer recommendations when filling out the laboratory soil sampling forms and that any testing service you use is accredited. A listing of OMAF-accredited soil testing laboratories is available at www.omaf.gov.on.ca.

Page 31. *Nutrient Management Act* information

Remove The *Nutrient Management Act* received Royal Assent on June 27, 2002. Regulations are being drafted. For the most up-to-date information on this legislation, refer to the OMAF web site at www.omaf.gov.on.ca or phone the Agricultural Information Contact Centre at 1-877-424-1300.

Replace with A nutrient management plan matches the nutrients required by the crop with the nutrients available in manure, from cover crops or legumes plowed down in commercial fertilizer and in the soil. Analysis of nutrients contained in the manure, along with soil test results and crop requirements, help determine application rates and additional commercial fertilizer requirements.

Following a nutrient management plan will optimize the nutrients applied to the crop for crop yield and profitability, while reducing the risk of surface or groundwater contamination by nitrogen or phosphorus.

Regulations under the *Nutrient Management Act* require some farmers to complete nutrient management plans (NMPs) for their farming operations. This requirement applies to new livestock operations and to operations expanding above 300 nutrient units. The above regulations will also apply, as of July 1, 2005, to existing operations that generate 300 nutrient units or more.

Other farms that receive and apply nutrients may come under a requirement to complete an NMP at a future date. Outside of the legal obligation, many farmers are completing nutrient management plans because it saves money and improves the management of inputs on their farms.

For the most up-to-date information on this legislation, refer to the OMAF web site at www.omaf.gov.on.ca or phone the Agricultural Information Contact Centre at 1-877-424-1300.

CHAPTER 3. RECOMMENDED VARIETIES

Page 32. After third paragraph

Add

When making the transition to a new or different variety, it is best to grow only a limited acreage until more experience (i.e. nitrogen requirements) is gained.

Page 32–34.

Remove

Variety descriptions for CT144, CT572, RG 17 and RG 81.

Replace with

CT144

Registered in 2001. Derived from a cross between Canadian breeding line TB5-2 and American variety K326. CT144 tends to produce a higher yield than Delgold and CT157. Typically, CT144 tops 2–3 days later than Delgold and CT157 and has 1–2 more leaves to harvest. CT144 is slightly taller in plant height than Delgold. Similar to CT572, this variety appears to be more susceptible to weather fleck. CT144 has exhibited intermediate tolerance to black root rot. The company evaluations are higher for CT144 than for Delgold, but lower than CT157.

CT572

Registered in 2001. It is a cross between Canadian breeding line TB5-2 and American variety K149. Yield and grade index are higher than Delgold and Delfield. Days to topping is about 3 days longer, and it typically has one leaf more than Delgold. CT572 produces more "M" and "O" than most of the other registered varieties. CT572 appears to be more susceptible to weather fleck, which is a brown leaf spotting caused by ozone pollution. Be cautious when growing this variety on wet, cold-bottomed soils as spotting can become quite prevalent. Tolerance to black root rot is similar to Delgold. Company evaluations are higher than Delgold and slightly lower than CT157. CT572 tends to be more sensitive to nitrogen than some other varieties. Overfeeding can result in increased leaf size and later maturity.

RG 17

Restricted registration under the *Canada Seeds Act* until January 11, 2006. RG 17 was first registered in the U.S. Derived from a cross between K326 and K399. RG 17 is higher in yield but lower in grade index when compared to CT157. RG 17 can produce more ground suckers in certain years. Days to topping is 2 days longer than Delfield and Delgold.

RG 81

Restricted registration under the *Canada Seeds Act* until January 11, 2006. RG 81 is a conventional variety first registered in the U. S. Derived from crosses between K326 and K399. RG 81 provides a higher grade index than Delgold. In other comparisons to Delgold, RG 81 is similar in yield and black root rot tolerance and about 2-3 days later topping. The leaves tend to be smaller than Delgold and Delfield. Typically total "O&M" grades are higher and "F", "G" and "CR" grades lower than Delgold and Delfield. The company evaluations are higher than Delgold, but lower than CT157.

Page 34–35.

Remove Table 3-1, Table 3-2, Table 3-3.

Replace with

Table 3-1. Registered Variety Trial, 3-year average, 2001-2003 — Delhi

	Delfield	Delgold	Delliot	AC Gayed	AC Cheng	AC White	CT 144	CT 157	CT 166	CT 572	CT 681
Grade Index (¢/kg)[1]	465	461	446	448	463	454	473	482	463	486	447
Yield (kg/ha)	3490	3483	3510	3417	3467	3685	3574	3277	3628	3585	3857
Returns ($/ha)	16258	16078	15637	15340	16097	16784	16953	15803	16799	17470	17277
Days to Topping	62	63	63	61	62	65	66	64	63	66	64
Topping Height (cm)	98.4	97.4	104.4	96.2	100.9	101.0	99.3	101.9	101.3	100.1	100.9
Number of Leaves	18.2	18.2	16.6	17.4	17.8	18.9	19.3	18.6	19.0	18.9	18.8
Leaf Spacing (cm)	5.4	5.4	6.3	5.5	5.7	5.4	5.2	5.5	5.4	5.3	5.4
Ground Suckers (kg/ha)[2]	22.9	13.1	25.3	17.4	14.4	18.2	11.2	15.6	41.0	23.8	13.9
Width 8th Leaf (cm)	33	33	37	34	34	33	31	32	32	32	34
Length 8th Leaf (cm)	63	64	65	64	65	65	64	63	65	63	65
Area 8th Leaf (cm)	1388	1406	1596	1450	1470	1412	1352	1336	1408	1362	1509
Width 3 Tip Leaves (cm)	28	28	31	30	30	28	27	29	29	28	30
Length 3 Tip Leaves (cm)	62	62	62	61	63	63	61	61	62	61	63
Area 3 Tip Leaves (cm)	1170	1171	1297	1233	1296	1210	1115	1176	1210	1143	1279
Black Root Rot Rating[3]	3.9	3.9	4.1	7.6	4.1	4.0	4.3	4.0	3.8	4.6	7.5
% Grade Composition (by grade type)											
M	0.0	2.2	0.0	1.1	7.8	0.2	7.7	4.4	0.0	29.3	0.0
O	45.9	37.7	19.8	27.7	27.5	35.3	33.7	57.4	27.8	46.9	32.2
F	8.7	15.5	24.0	19.1	9.7	7.5	9.3	6.5	5.5	6.0	7.3
L	15.2	12.8	16.7	9.6	22.9	21.1	26.3	13.9	50.7	7.1	16.0
G	6.2	6.0	8.5	7.0	5.4	6.7	5.4	5.6	1.1	3.2	7.3
R	0.2	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.1
A	3.7	2.6	3.3	2.5	4.1	1.1	2.2	0.9	3.6	0.1	2.6
BG	13.9	14.1	20.5	21.8	13.8	25.9	11.4	3.7	8.3	3.2	30.5
V	0.5	2.4	4.5	3.3	1.0	0.1	0.7	1.5	1.2	0.2	1.5
CR	4.0	4.5	1.5	6.7	6.1	0.7	1.3	3.5	0.3	0.6	0.7
K	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND	1.6	2.2	1.1	1.0	1.6	1.4	2.0	2.7	1.5	3.5	1.9
Company Rating[4]	66	62	60	61	62	65	66	77	60	75	65

[1] Prices are based on 1998 grade price.

[2] Ground suckers (kg/ha) data was collected during mid-July, shortly after hilling.

[3] Rating is based on a scale of 1 (susceptible) to 10 (immune).

[4] Rating is based only on visual attributes of the cured leaf. Higher number = better rating.

Table 3-2. Registered Variety Trial, 2-year average, 2002–2003 — Delhi

		Delfield	Delgold	Delliot	AC Gayed	AC Cheng	AC White	CT 144	CT 157	CT 166	CT 572	CT 681	RG17[5]	RG81[5]
Grade Index (c/kg)[1]		456	458	442	444	455	444	464	475	465	482	436	427	484
Yield (kg/ha)		3358	3325	3436	3365	3369	3549	3423	3110	3522	3386	3761	3337	3309
Returns ($/ha)		15327	15216	15152	14946	15366	15771	15940	14772	16414	16324	16435	14246	16004
Days to Topping		61	61	61	60	60	63	64	63	62	64	63	63	64
Topping Height (cm)		98.8	95.7	100.6	97.5	99.4	99.9	97.4	99.0	100.3	100.5	100.7	100.6	98.3
Number of Leaves		18.2	18.0	16.5	17.7	17.5	18.9	19.3	18.2	18.8	18.8	18.6	18.9	18.9
Leaf Spacing (cm)		5.5	5.3	6.1	5.5	5.7	5.3	5.1	5.5	5.4	5.4	5.4	5.4	5.2
Ground Suckers (kg/ha)[2]		19.7	9.0	36.5	13.1	17.8	22.2	7.5	8.7	42.3	28.0	12.3	42.5	34.5
Width 8th Leaf (cm)		33	34	38	36	35	33	33	33	34	34	35	32	32
Length 8th Leaf (cm)		64	63	66	65	65	65	64	63	65	64	65	66	64
Area 8th Leaf (cm)		1424	1414	1666	1536	1542	1441	1415	1399	1453	1459	1509	1417	1366
Width 3 Tip Leaves (cm)		28	29	33	30	31	30	28	30	30	28	31	27	27
Length 3 Tip Leaves (cm)		61	61	62	61	63	64	61	61	62	62	63	60	59
Area 3 Tip Leaves (cm)		1170	1195	1377	1224	1317	1274	1161	1227	1252	1191	1315	1081	1082
Black Root Rot Rating[3]		4.0	4.2	4.2	7.4	4.2	4.4	4.1	4.2	4.0	4.8	6.8	3.0	3.9
% Grade Composition (by grade type)														
	M	0.0	0.1	0.0	0.3	4.7	0.0	8.8	4.0	0.0	25.1	0.0	0.0	0.2
	O	39.1	33.8	22.7	30.6	24.3	26.6	26.7	53.3	25.1	47.6	23.2	10.5	60.1
	F	10.7	16.2	18.9	13.5	11.3	9.2	12.7	9.3	6.9	7.8	8.5	11.0	12.5
	L	14.9	15.6	12.7	7.5	22.4	18.2	22.1	12.1	49.7	6.9	14.7	37.8	18.1
	G	8.7	7.9	12.0	9.1	7.9	9.6	7.3	7.7	1.6	4.7	9.2	0.3	0.9
	R	0.3	0.2	0.1	0.5	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.0	0.0
	A	3.7	1.9	2.7	1.7	2.6	1.4	3.3	1.1	3.1	0.1	0.5	0.0	1.7
	BG	17.1	16.9	27.2	27.5	17.1	32.4	14.2	4.1	10.8	3.3	39.2	28.5	1.7
	V	0.4	2.3	1.0	2.3	0.8	0.1	0.8	1.8	0.5	0.1	1.4	9.5	1.5
	CR	3.3	3.2	1.4	5.8	7.0	0.9	1.7	3.4	0.4	0.8	0.7	0.2	0.7
	K	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	ND	1.9	2.2	1.4	1.3	1.9	1.6	2.3	3.3	1.8	3.5	2.5	2.3	2.8
Company Rating[4]		66	59	58	59	61	63	65	76	61	73	60	53	67

1 Prices are based on 1998 grade price.
2 Ground suckers (kg/ha) data was collected during mid-July, shortly after hilling.
3 Rating is based on a scale of 1 (susceptible) to 10 (immune).
4 Rating is based only on visual attributes of the cured leaf. Higher number = better rating.
5 Varieties with a restricted registration under the *Canada Seeds Act*, expiring January 11, 2006.

Table 3-3. Registered Variety Trial, 2003 — Delhi

	Delfield	Delgold	Delliot	AC Gayed	AC Cheng	AC White	CT 144	CT 157	CT 166	CT 572	CT 581	RG17[5]	RG81[5]
Grade Index (¢/kg)[1]	445	453	438	437	448	432	455	473	458	479	428	432	485
Yield (kg/ha)	3020	3129	3224	3103	3180	3307	3016	2899	3303	3090	3406	2913	2856
Returns ($/ha)	13436	14177	14084	13568	14249	14286	13729	13709	15119	14816	14589	12587	13837
Days to Topping	62	62	62	61	61	63	65	63	63	65	64	65	64
Topping Height (cm)	99.3	97.2	100.8	100.5	101.6	100.3	93.4	97.6	101.7	100.7	99.7	98.9	95.8
Number of Leaves	16.9	17.1	16.2	16.9	16.8	17.6	17.3	16.8	17.4	17.9	17.3	17.1	17.1
Leaf Spacing (cm)	5.9	5.7	6.2	5.9	6.0	5.7	5.4	5.8	5.8	5.6	5.8	5.8	5.6
Ground Suckers (kg/ha)[2]	15.8	9.0	45.9	14.2	17.7	16.1	3.1	6.9	59.2	28.8	6.0	31.8	24.1
Width 8th Leaf (cm)	34	34	38	37	36	35	36	34	36	34	36	35	33
Length 8th Leaf (cm)	63	62	65	65	64	63	62	64	66	63	65	66	62
Area 8th Leaf (cm)	1425	1419	1675	1604	1554	1500	1502	1476	1597	1468	1598	1539	1398
Width 3 Tip Leaves (cm)	24	25	29	27	27	26	25	27	27	26	28	23	24
Length 3 Tip Leaves(cm)	58	57	60	58	60	62	58	60	61	60	61	57	55
Area 3 Tip Leaves (cm)	960	957	1163	1053	1070	1106	963	1089	1138	1037	1162	901	878
Black Root Rot Rating[3]	4.3	4.1	4.3	8.3	4.5	4.5	4.3	4.2	4.2	5.6	8.4	2.8	4.0
% Grade Composition (by grade type)													
M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.5	0.0	0.0	0.0
O	21.7	16.9	18.2	24.8	14.5	15.5	21.7	45.5	14.3	43.8	17.8	9.3	44.9
F	8.5	16.5	9.3	7.1	8.4	0.2	12.8	14.1	6.2	8.7	0.0	2.5	17.4
L	29.6	29.3	22.2	13.5	36.6	29.7	33.8	22.6	48.8	8.0	20.5	36.2	27.5
G	0.5	3.5	0.2	0.1	0.1	0.1	0.0	0.3	0.1	2.0	0.7	0.0	0.0
R	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A	7.3	3.7	2.3	3.4	5.2	2.8	6.6	0.0	6.1	0.2	1.1	0.0	3.3
BG	28.0	22.3	44.6	44.8	28.8	49.2	20.4	8.0	20.9	6.1	55.2	49.2	0.6
V	0.2	3.9	0.1	0.0	0.1	0.0	0.5	3.6	0.9	0.2	0.2	0.0	2.4
CR	1.5	1.8	0.6	4.8	3.4	0.0	1.0	1.8	0.1	1.1	0.4	0.3	0.5
K	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ND	2.7	2.1	2.5	1.5	3.0	2.4	3.2	4.2	2.5	4.4	4.1	2.6	3.4
Company Rating[4]	63	60	55	55	61	60	65	72	65	72	59	53	67

1 Prices are based on 1998 grade price.
2 Ground suckers (kg/ha) data was collected during mid-July, shortly after hilling.
3 Rating is based on a scale of 1 (susceptible) to 10 (immune).
4 Rating is based only on visual attributes of the cured leaf. Higher number = better rating.
5 Varieties with a restricted registration under the *Canada Seeds Act*, expiring January 11, 2006.

Page 41 and 42. Disease control — *Fumigating*

Remove Vorlex Plus

Page 42. Disease control — Plug tray sterilization

Remove Third paragraph

Replace with Chemical sterilants, such as Virkon and bleach (sodium hypochlorite) were found to be ineffective in eliminating *Rhizoctonia solani, Alternaria spp., Rhizopus spp.* and algae species from used Styrofoam trays. Styrofoam trays are porous and can harbour diseases within the cell walls, making it difficult for chemical sterilants to come in contact and kill these organisms.

A steam treatment of 80°C (176°F) for **at least 30 minutes** was found to be effective in eliminating *Rhizoctonia solani* from infested Styrofoam trays, but was unable to rid these trays of all other micro-organisms. If the trays are stacked on pallets, take care that the steam reaches all the tray surfaces in the stack and that a minimum temperature of 80°C (176°F) is maintained for 30 minutes. Please check with the plug tray supplier for information on tray exposure to high steam temperatures, since some trays may shrink, warp or distort under these conditions.

It is recommended that Styrofoam trays be thrown out if Tobacco Mosaic Virus (TMV) was present in your greenhouse last year.

Page 42. Disease control — after Plug tray sterilization

Add **Tray Disposal**
Tray disposal at a licensed landfill site is an option. Burning or on-farm burial is not recommended. Limited recycling opportunities do exist in some areas, such as the Canadian Polystyrene Recycling Association, telephone 905-612-8290.

Page 42. Disease control — Damping-off (bed rot)

Remove **from *Control* section, 1st paragraph, 2nd sentence**
When damping-off first appears, apply Benlate 50% WP at 125 g in 230–320 L of water per 100 m^2. Repeat if necessary.

2nd paragraph
Benlate provides good control of the more common *Rhizoctonia* type of damping-off.

The above section was removed from the recommendations as Benlate is no longer registered for use.

Page 43. Disease control — after Blue Mold

Add **Tobacco Mosaic Virus (TMV)**
TMV symptoms are virtually undetectable in greenhouse seedlings. Leaf mottling does not appear until after transplanting.

Control
Carry out good sanitation practices in the greenhouse. Take care not to introduce the disease into the greenhouse. Do not grow other susceptible host plants, such as peppers and tomatoes in the same greenhouse. Do not use tobacco products in the greenhouse. Wash your hands well after smoking and before entering the greenhouse. Remove all susceptible weeds, such as horse-nettle, jimsonweed and ground cherry, from the greenhouse and surrounding area.

TMV is transmitted mainly by mechanical transmission (by contact), especially when surfaces are wet. TMV can be spread when clipping tobacco seedlings. Between clipping in each greenhouse wash the blades and underside of the clipper thoroughly with soapy water, then sanitize with 2.6% solution of sodium hypochlorite (mix 1 part common household bleach with 1 part water). Rinse with water.

Disinfect walls, walks, floats, hoses, clippers and any other greenhouse surface or equipment that may have come in contact with this disease. Do not re-use contaminated Styrofoam trays that were exposed to TMV. There is no guarantee that any sterilization method will eliminate TMV from areas where infected roots may have penetrated the Styrofoam.

CHAPTER 5: WEED MANAGEMENT

Page 45. Adjuvants

Remove Companion, Enhance

Pages 45.

Remove Companion

Page 46.

Remove Enhance

Page 46. Fluazifop-p-butyl

Remove Fusilade II

Page 47. Fumigants

Remove methyl isothiocyanate/dichloropropene, methyl isothiocyanate/dichloropropene/chloropicrin

Add dazomet

Page 47.

Remove Glyphosate TMS

Page 47. Glyphosate — Trade names

Remove Laredo, Touchdown 480, Touchdown 600

Add Touchdown iQ

Page 48.

Remove methyl isothiocyanate/dichloropropene

Remove methyl isothiocyanate/dichloropropene/chloropicrin

Page 49. Surfactants

Remove Companion, Enhance

Page 49. Table 5-1. Weed control in flue-cured tobacco

Remove Fusilade II, glyphosate TMS, Touchdown 480

Page 52. Sucker control

Remove Gold Leaf C-10

Remove "Before fopping" heading in Table 6-2.

Replace with "Before topping"

Page 52. After Sucker control

Add

Environmental Factors

Weather fleck

Weather fleck, a leaf disorder of flue-cured tobacco, is caused by certain oxidants in the air, mainly ozone. Oxidants damage the leaf tissue and cause small, irregularly shaped spots to develop. The spots are generally less than 4 mm in diameter. The spots are initially black but later turn brown and eventually greyish-white. The most serious losses generally occur just before or during the early part of harvest when the lower leaves are maturing. Later in the season and with the gradual maturation of the upper leaves, weather fleck starts to show on these leaves.

Weather fleck damage is more severe in areas where prevailing winds with high levels of ozone and misty or foggy conditions occur (i.e. areas close to Lake Erie). Weather fleck injury can be worse with heavy rains or irrigation and when soil nitrogen levels are low.

Control

Present control measures involve cultural practices and choosing tolerant varieties. Cultural practices such as proper plant spacing (page 50), proper irrigation, well-balanced fertilization, early topping and clean suckering help produce a leaf that is less susceptible to weather fleck. For tolerance levels of varieties, see "Recommended Varieties" on page 32.

Frenching

This disorder appears occasionally, especially on marginal tobacco land. Severely affected plants are stunted, and the leaves become thick and strap-like. Sometimes only the suckers are affected.

Control

The tendency to french is related to soil conditions. Improved drainage and good fertilization practices may help prevent this disorder.

Physiological leaf spot

Brown or white spotting will form usually in the bottom stalk positions, but may be present in mid-stalk positions as well. These spots have been associated with cold-bottom soils and can also appear where a hardpan is found within 60 cm (24 in.) of the soil surface. In cold, wet weather conditions this disorder can be more prevalent.

Control

Efforts to reduce soil compaction and improve nutrient availability, such as improved drainage and good fertilization, and cultural practices may help to prevent this disorder. Avoid cold-bottom soils if possible. CT572 and CT144 may be more susceptible to spotting than some other registered varieties.

Page 53. Disease control — *Nematodes*

Remove Vorlex Plus from Table 6-3.

Replace with

Table 6-3. Treatments for nematode control

	Row	
	L/ha (107 cm rows)	*mL/100 m of row
Telone II	75–90	803–963
Vapam	65–85	696–910

* mL/100 m of row remains the same regardless of row width

Page 53. Disease control — *Black root rot*

Remove Vorlex Plus from Table 6-4.

Replace with

Table 6-4. Multi-purpose fumigant treatments

	Row	
	L/ha (107 cm rows)	*mL/100 m of row
Telone C-17	75–100	803–1,070
Chloropicrin 100	28	280

* mL/100 m of row remains the same regardless of row width

Page 53. Disease control — Fumigant damage caution box

Remove Second paragraph.

Replace with A week before transplanting, check several areas of the field, including a lower area, for fumigant still remaining in the soil. Knock down the top of the fumigant hill and transplant about 10 plants down the centre of the row. If a four-row applicator was used, transplant into each of the four rows to check the consistency of the application. As a comparison, 10 plants should be planted between the fumigant rows where no fumigant was applied. After a couple of days, check the plants early in the morning to see if they are standing up as compared to the plants between the fumigant rows. If only the plants in the fumigant row are laying down and their stems are limp below ground without any signs of insect feeding, fumigant is still present in the soil. In this case, the hills should be opened with a single chisel or cultivator tooth about 2 to 3 days prior to planting in order to allow the remaining fumigant to escape. Reopening may be necessary if heavy rainfall and cool temperatures occur after the initial opening.

Page 53. Disease control

Remove Weather fleck section.

Page 54. Disease control

Remove Frenching section.

Page 58. Insect control — Hornworms

Remove From Table 6-10, remove rows Sevin 50% WP and Sevin 80% WP and Orthene 75% SP @ rate of 725 g/ha.

Replace with Orthene 75% SP @ rate of 750 – 1,100 g/ha

TABLE 6-10. Treatment for hornworms

	Amount per ha	Preharvest interval (days)
Dipel	275 g	–
Thuricide HPC	1–1.5 L[1]	–
Orthene 75% SP	750–1,100 g[1]	3
Dylox 420 EC	2.75 L	3
Sevin XLR Plus 480 Su	2.5 L	3
Lannate Liquid[2]	2.25 L	5

[1] Use the higher rate when insect pressure is severe, large worms are present, or the foliage is abnormally rank and dense.
[2] Minimum period before entering fields treated with Lannate is 24 hours.

Page 58. Insect control — Aphids

Remove Pirimor 50% WP from Table 6-11.

Replace with

TABLE 6-11. Treatment for aphids

	Amount per ha	Pre-harvest interval (days)
Pirimor 50% DF	275–550 g[1]	14
Orthene 75% SP	750–1,100 g[1]	3
Lannate Liquid[2]	2.25 L	5
Malathion 50% EC[3]	2 L	7

[1] Use the higher rate when a heavy infestation occurs throughout the field and when weather is hot and dry.
[2] Minimum period before entering fields treated with Lannate is 24 hours.
[3] Malathion is not effective at temperatures below 18 C.

Page 59. Insect control — Flea beetles

Remove From Table 6-12, remove rows Sevin 50% WP and Sevin 80% WP and Orthene 75% SP @ rate of 725 g/ha

Replace with Orthene 75% SP @ rate of 750 – 1,100 g/ha

TABLE 6-12. Treatment for flea beetles

	Amount per ha	Pre-harvest interval (days)
Sevin XLR Plus 480 Su	2.5 L	3
Orthene 75% SP	750–1,100 g	3

Recycle old editions of this publication. Each year the appropriate working group of the Ontario Pest Management Research and Services Committee reviews the pesticides listed in this publication. To the best knowledge of the committee, at the time of printing, all of these pesticides were:

- federally registered
- reviewed by the Ontario Pesticides Advisory Committee (OPAC)
- classified by the Ministry of the Environment as of June 2004.

The information in this publication is general information only. By printing this publication, the Ministry of Agriculture and Food does not offer any warranty or guarantee, nor does it assume any liability for any crop loss, animal loss, health, safety or environmental hazard caused by the use of a pesticide mentioned in this publication.

The pesticide product label is a legal document. It is against the law to use the product in any other way. You must also use all pesticides in accordance with the *Pesticides Act* and Regulation 914, administered by the Ontario Ministry of the Environment.

In this publication, most recommendations list several pesticides that can be used for each pest discussed. In general the least hazardous materials and those pesticides that pesticide applicators have used satisfactorily for years are listed first. More toxic pesticides and/or newer ones with less practical grower experience follow.

This publication lists a number of brand names of pesticides. This is for your convenience only. It is neither an endorsement of the product nor a suggestion that similar products are ineffective.

Consult each product label for specific information such as compatibility with other materials and the effect of environmental conditions. Weather and other factors influence the effectiveness of pesticides and the likelihood of crop injury.

Health Canada has established maximum residue limits (MRLs) for pesticides. Processors or retailers may demand more restrictive limits. Growers should seek advice of their intended market as to which restrictions or limitations apply. Keep accurate and up-to-date records on pesticide use in each crop.

Federal Registration of Pesticide Products

The Pest Management Regulatory Agency (PMRA) of Health Canada grants registration following an evaluation of scientific data to ensure that the product has merit and value; and the human health and environmental risks associated with its proposed use are acceptable.

1.Full Registration

Pesticide registrations are normally granted for a period of five years, subject to renewal.

2.Temporary Registration

Temporary registration may be granted for a period not to exceed one year, where the registrant agrees to produce additional scientific or technical information, or the pesticide is used for emergency control of a serious pest outbreak.

Supplemental Labels

You MUST obtain a supplemental label and follow all the label directions when PMRA approves new uses for a registered pesticide that do not appear on the current label.

Examples of when you must use a supplemental label include:

- **Temporary Registrations for Emergency Use**
- **Minor Use Label Expansion** (new label statements for crops that do not already appear on that product label)

You can obtain a copy of a supplemental label from the pesticide manufacturer or pesticide vendor, the grower association that sponsored the emergency registration or minor use, from OMAF or PMRA' s Pest Management Information Service.

For more information on the federal registration status check the PMRA web site at *www.hc-sc.gc.ca/pmra-arla* or call 1-800-267-6315.

Regulation of Pesticides in Ontario

Classification of Pesticides into "Schedules"

The Ministry of the Environment classifies all pesticide products into one of six schedules, based on the potential hazards that product may have for human health and the environment. For up-to-date information on the regulatory status of any pesticide check the Ontario Pesticides Advisory Committee web site at *www.opac.gov.on.ca* or call (416) 314-9230/ fax (416) 314-9237.

Licensing and Certification Requirements for Pesticide Users

You must be a certified grower or licensed exterminator to buy and use Schedule 1, 2 and 5 pesticides.

Requirements for Growers and their Assistants

Growers must be certified through the **Grower Pesticide Safety Course** to buy and use Schedules 1, 2 or 5 pesticides on land they farm. There must be at least one certified grower for each farm operation.

All agricultural assistants must also receive formal pesticide safety training, recognized by the Ministry of the Environment, before they can use Schedule 2 or 5 pesticides under the supervision of a certified grower. This applies to all assistants — including family members, farm employees and seasonal workers.

For more information about training for growers and agricultural assistants check the Ontario Pesticide Education Program Web site at *www.ridgetownc.uoguelph.ca/opep/* or call 1-800-652-8573.

Requirements for Commercial Applicators and their Assistants

If you plan to apply pesticides as a business, you must be a licensed exterminator. **This includes farmers who custom apply pesticides for other farmers and charge a fee for this service.** You must complete a home study course and certification exam, and send proof of certification to the Ministry of the Environment to obtain your license.

Unlicensed assistants must be Technicians before they may handle Schedule 2 (with restrictions), 3, 4 and 6 products under indirect supervision of a licensed exterminator. Technicians may not handle Schedule 1 and 5 products. For more information about exterminators and technicians check the Ontario Pesticide Training and Certification web site at *www.ridgetownc.uoguelph.ca/optc* or call 1-888-620-9999.

Published by the Ministry of Agriculture and Food
© Queen's Printer for Ontario, 2004
REV 06-04-1.3M
ISSN 1492-5397